

## INFORMATION MANAGING SYSTEM

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### Abstract

A local positioning system for determining the position of mobile units, such terminals mounted on shopping carts in a store, comprising a base unit, a number of position-signal transmission units and at least one mobile unit. The base unit has transmitter means for emission of an activation signal to the position-signal transmission units and to the mobile unit. In addition, the position-signal transmission units have receiver means for reception of the activation signal and means for emission of a sound signal to the mobile unit in response to the activation signal. The mobile units have means for reception of said activation signal and sound signal, respectively, and processing means for determining the time differential between reception of the activation signal and the sound signal and for calculating the position relative to the position-signal transmission unit based on said time differential.

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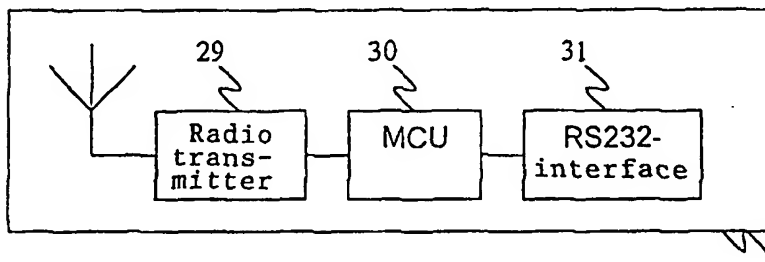
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(57) Abstract: A local positioning system for determining the position of mobile units, such terminals mounted on shopping carts in a store, comprising a base unit, a number of position-signal transmission units and at least one mobile unit. The base unit has transmitter means for emission of an activation signal to the position-signal transmission units and to the mobile unit. In addition, the position-signal transmission units have receiver means for reception of the activation signal and means for emission of a sound signal to the mobile unit in response to the activation signal. The mobile units have means for reception of said activation signal and sound signal, respectively, and processing means for determining the time differential between reception of the activation signal and the sound signal and for calculating the position relative to the position-signal transmission unit based on said time differential.

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## INFORMATION MANAGING SYSTEM

Technical Field

The present invention relates to a local positioning system for determination of the position of mobile units, such as shopping-cart mounted terminals in a shop or store.

The invention likewise concerns a data processing system for sales facilities for consumer products.

10 Technical Background

Shops and other establishments tend to increase in size while at the same time the supply of goods for sale has increased. Furthermore, novel facilities for buying products or services have appeared, above all via the Internet. Consequently, there is a need in traditional establishments for making purchases of goods or services more convenient, i.e. to assist the customer in finding the articles he needs or the information he is requesting. Also, with the growing supply of goods for sale, the producers of items of merchandise and services are anxious to find more efficient ways of presenting information on their own products.

In order to solve this problem US 5 287 266 suggests the use of mobile units that provide the customer with information. US 5 287 266 describes a shopping-cart mounted terminal fitted with a display screen. The terminal is connected to a wireless network. According to the description, the terminal is receptive to signals that activate different messages. The signals are emitted by transmitters arranged on different locations inside

the shop, for instance on the shelf edges. An advertisement message could, for instance, be presented on the display screen as the customer passes by a particular shelf. The system is based on each transmitter  
5 emitting a unique signal triggering a specific message that is associated with that signal. The system also offers the customer a possibility of receiving information e.g. on which shelf a particular product is located, recipes via an interactive cookery book or a  
10 queue ticket number to the delicatessen counter. It also provides a possibility of producing a general survey map of the shop, showing its layout and aisles.

The publication US 5 821 513 describes a similar system, comprising a base unit and a number of mobile  
15 terminals. Like in the system mentioned above, transmitters emitting unique signals are located inside the shop. This system, is, however somewhat more advanced in that when the mobile terminal receives such a signal it requests from the base unit information associated  
20 with the signal and displays such information on the display screen of the mobile terminal. In addition, the terminal provides facilities for searching for a product and for showing a map of the shop on which the location of the desired product is marked.

25 The limitation of the systems of both US 5 287 266 and US 5 821 513 is that they are based on a system according to which the shop is divided into different zones in which are located transmitters triggering different events in the mobile unit. A system of this  
30 kind does not provide a high degree of accuracy. If a high degree of accuracy is aimed at in this kind of system a considerable number of transmitter units must be arranged on different locations. This type of system is

limited also in that it is difficult to use it to offer assistance in finding the way within the zone concerned. Likewise, it becomes difficult to direct information to the various products within the same zone. In addition,  
5 considerable difficulties are involved in using a system of this kind in larger establishments, such as airports, harbour areas or storage premises.

#### Summary of the Invention

10 The object of the present invention is to provide an improved system of determining the position of mobile units present within a limited space, such as a shop. Another object is to provide a mobile unit utilising the position determination system in order to produce a route  
15 guide showing the path from the present position to a chosen position. Yet another object is to provide an improved method of determining the position of mobile units.

Yet another object of the present invention is to  
20 provide an improved data processing system intended for sales facilities for consumer products.

These objects are achieved by means of a positioning system and a position-determining method having the characteristics defined in the appended claims.

25 Advantageously, the system is used as an aid in everyday-commodity shops, where customers rapidly and simply can find a desired article with the aid of the system. It could very well also be used in other establishments, such as in airports, storage premises,  
30 harbour areas or other limited areas. When used in an airport, the mobile units of the system can be mounted on the luggage trolleys and provide the travellers with

precise information on departure times, delays, boarding status and routes to the correct gate.

Since the system in accordance with the invention is able to determine positions more accurately than already  
5 known systems, the system is able to show, for instance with the aid of arrows on a display screen, precisely in which direction the user has to walk to reach his destination in the most convenient manner.

The positioning system could also be used in a shop  
10 or store to supply the customers with advertisements directly associated with the products on offer. If the customer has entered his shopping list into the mobile unit, the system could suggest a suitable route through the shop passing by the products that the customer wishes  
15 to purchase. En route, the system could also make the customer aware of various products on offer.

Based on the information gathered by the system on the movements of the mobile unit it becomes possible to make a most detailed flow analysis. The shop owner is  
20 able to obtain exact information regarding which shelves that an individual mobile unit has passed, where it has stopped and for how long. The data thus obtain could be analysed and decisions be made as to re-locations or conversions based on the movements of the mobile unit.

25 If the system is supplemented with a speech module and an earpiece it could be used as an aid for those visually impaired. Possibly, a special unit could be constructed wherein the positioning system is employed to assist visually impaired individuals to orient themselves  
30 in an unknown environment, such as in public premises.

The positioning system could be interconnected with a handheld computer and thus fit the handheld computer with the functions offered by the system. Arranged in

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this way, the shopping list could be stored electronically in the handheld computer and when the customer visits the shop, the system will show him where all listed articles are located, thus minimising the risk  
5 that any item is forgotten.

#### Brief Description of the Drawings

The invention will be described in the following with reference to the accompanying drawings, wherein

10 Fig 1 is a schematic view showing the structure of a positioning system in accordance with a preferred embodiment,

Fig 2 is a schematic view showing the structure of a mobile unit,

15 Fig 3 illustrates the principles of the position-determination process,

Fig 4 is a schematic view showing the structure of a control unit for the position-signalling system, and

20 Fig 5 is a schematic view showing the structure of a position-signal transmission unit.

#### Detailed Description of Preferred Embodiments

In a preferred embodiment the positioning system comprises a base unit 1, a position-signalling system 2  
25 and at least one mobile unit 7, which likewise could be configured as a mobile administration terminal 8 as shown in Fig 1. The base unit 1, which preferably is a computer of some kind, controls and checks the other parts of the system.

30 The control unit 3 of the position-signalling system is connected directly to the base unit 1. The base unit 1 supplies the control unit 3 with instructions for controlling the transmission of the position-signal

transmission unit 4 of a positioning signal, which preferably is a brief ultrasound pulse. The ultrasound pulses are used by the system to calculate the position of the mobile units. The position of the mobile units 7 is determined with the aid of the position-signal transmission units 4 emitting at regular intervals a signal received by the micro-controllers 18 of the mobile units 7 and used by said controllers to calculate their position. Based on the signal from three or more position-signal transmission units the position may be calculated by triangulation. If less than three position-signal transmission units are available, the position is determined based on knowledge of the previous position. With the aid of information from the compass module 15, the mobile unit 7 is able to determine in which direction the shopping cart is headed and thus furnish the customer with a route guide to a particular article.

The control unit 3 of the position-signalling system 2 is the basis of the position-signalling system. Together with the position-signal transmission units 4 it enables the mobile unit 7 to determine its position. The control unit 3 likewise comprises a transmitter unit, preferably a radio transmitter 29, a control unit, preferably a micro-controller 30, and an RS232-interface 31 as shown in Fig 4. Advantageously, the radio transmitter 29 is a simple wireless serial communication unit. Suitable units are available on the market that operate on 433 MHz and 9600 Baud. A transmitter module is all that is needed to control the entire system of position-signal transmission units 4. Corresponding receiver modules are used in each position-signal transmission unit 4 and the mobile unit 7. Information emitted from the control unit 3 consists of short packets



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addressed to the position-signal transmission 4 unit to be activated, and error-correction data securing the system against transmission errors.

A micro-controller 30 is responsible for  
5 transmission of the information in the correct order.  
From the base unit 1, the micro-controller 30 receives information on which position-signal transmission unit addresses that are used and in which order they are to be activated. The micro controller 30 then runs this scheme  
10 over and over again. If the system is extended by more position-signal transmission units 4, only the data in the base unit 1 need to be changed. The new configuration is then forwarded to the control unit 3 via the serial RS232 interface 31. It is likewise possible to program  
15 the desired length of time between two packets. This period is determined by the maximum distance between the position-signal transmission units 4 and the mobile units 7. One ultrasound signal should have been sufficiently attenuated before the next ultrasound signal is emitted,  
20 and the reason therefor is to avoid mixing between two consecutive signals.

A position-signal transmission units 4, shown in Fig 5, comprises a radio receiver 32 receiving the signal from the checking unit 3, a micro-controller 33 arranged  
25 to decode received information and to activate the ultrasound transmitter 34 when needed. The ultrasound transmitter 34 consists of an oscillator 35 generating the wave configuration to the ultrasound loudspeaker 37. An amplifier 36 amplifies the signal and the loudspeaker  
30 37 then emits the signal in the air.

The radio receiver 32 is the same type of module as that used in the mobile units 16 and it receives the data packet from the transmitter module 29 in the control unit

3. The information received by the radio transmitter 32 from the checking unit 3 is forwarded into the micro-controller 33. In the controller, the data packet is decoded and if the address coincides with the pre-  
5 programmed address in the position-signal transmission unit 4, the micro-controller 33 activates the oscillator 35. The oscillator 35 generates e.g. sinus waves before it is again switched off. The signal waves are amplified before being sent on the air by the ultrasound  
10 loudspeaker 37. When the ultra-sonic waves reach the mobile units 7, the sound is entered via an ultrasound microphone 12. The signal from the microphone 12 is amplified before being A/D converted. The A/D converter 14 forwards the digital data to the micro-controller 18,  
15 which is thereafter able to assess the time needed for the sound waves to be transported through the air to the mobile unit 7.

Each position-signal transmission unit 4 preferably is programmed with a unique address. The programming  
20 operation could be effected by means of a conventional DIP switch, which makes it easy to alter the address when needed. If replacement of a unit is required, the address can rapidly be directed to the replacement unit. Another variety is that the position-signal transmission units 4  
25 transmit signals bearing the same address and that the distinction between them is effected by emitting them at predetermined time intervals in accordance with a known pattern.

The system could, however also use other position-  
30 determination signals than ultrasound signals, such as radio frequency signals. In one preferred embodiment of this kind a so called RFID system is used, as is known in other contexts to monitor industrial processes, trace

persons, and so on. In one system of this kind, the mobile units comprise a RFID reader, which could for instance be fixedly secured to a shopping cart.

Preferably, the mobile unit comprises a microprocessor or  
5 the like, and a transmission unit comprising an emitter and a receiver.

In addition, the position-signal transmission units are distributed in the environment wherein the mobile unit is to move, such as in shop premises. The position-  
10 signal transmission units advantageously are so called RFID tags. These could either be passive units receiving energy via transmission from the mobile unit and thereafter reflecting inductively a response signal based on response to the received signal. However, it is also  
15 possible to use active units. The position-signal transmission units preferably are provided with a unique identity, such as a serial number allowing unambiguous identification of each unit.

The position-signal transmission units preferably  
20 are arranged distributed in the environment in which the mobile unit is to move, such as in shop premises. They need not necessarily be evenly distributed but preferably could be located on particularly strategic locations. The range of contact, i.e. reading, between the mobile unit  
25 and the position-signal transmission units, could amount to anything from a few centimetres to ten meters or more. The distance between the position-signal transmission units and the range of the units is determined by the required degree of position accuracy and the current  
30 application.

In operation, the mobile unit emits a request for response to the listening position-signal transmission units in the neighbourhood, and these units respond if

able to hear the mobile unit, and in the case of passive units, if they receive sufficient energy to be activated. Thereafter, they emit a response comprising their identity, and based thereon it is possible for the mobile unit to distinguish discrete position-signal transmission units and in this way it becomes possible to determine the position of the mobile unit.

Based on the determined position, the mobile unit may then be supplied with position-dependent information as described elsewhere herein.

In the following, one particular application will be described in more detail, viz. application of the system in a shop. In this case, the base unit is formed with a database comprising data on the layout of the shop, indications of the location of the products in the shop and associated product information and prices. Also information on which articles presently are the objects of special sales offers likewise are stored in the database of the base unit 1. Up-dating of prices and other information in the base unit 8 is effected either via the mobile administration terminal 8 or from another computer connected to a network 9 in the shop or the Internet 10.

The mobile units 7 are that part of the system that serves for example the customers of a shop. They preferably have an interface to the user, such as a display screen 21, and feed-in means, which could be a simple keyboard 22, or a pressure-sensitive display screen. In the premises where the system is used a wireless network is established in the form of a Radio Local Area Network (R-LAN) 5. Via this network, data is exchanged between the base unit 1 and the mobile units 7.

Via the display screen 21 of the mobile unit 7 the customer can obtain information on where the articles are located. The customer can receive a map presented on the display screen 21 and mark the place of a requested  
5 article or else the system may determine the most convenient path to the article and guide the customer to that place, preferably by showing the customer the direction by means of for instance arrows on the display screen 21. Another service that the mobile units 7 may  
10 offer is to keep the customer up-dated on the queue number to the delicatessen counter and so on. The mobile units 7 preferably also a provided with a bar code reader 24 arranged to provide the customer with the price of a product but which could also be used to keep track of the  
15 total cost of the items the customer has put in his cart. The bar code reader 24 is fitted with a reflection detector, which reads the bar code optically. The data is forwarded to the micro-controller 18 of the mobile unit, in which the data is decoded and interpreted. The memory  
20 of the micro-controller 18 contains programs for interpretation of the codes used in the shop, such as different EAN codes. The code is transmitted to the base unit 1, which returns the data on the product to the mobile unit 7.

25 Via the mobile unit 7, the customer may also obtain suggestions for dishes and recipes. Preferably, the customer may chose between several languages that are pre-defined in the mobile unit 7, facilitating use of the system by individuals of a foreign origin. The graphical  
30 design of the display screen 21 makes it possible to use symbols that are not part of the occidental alphabet, such as Arabic letters. The system comprises data on the price of the product and possibly a list of its contents.

Suggestions of menus in which the product is included could also be presented as also pictures of the product. When the customer looks for an item within a group of products on special offer the system advantageously makes the customer aware of the special-offer product. Likewise, the system could draw attention to other special-offer products as the customer passes by them.

With the aid of the positioning system the position inside the shop of the mobile unit 7 is constantly known. The positioning system in accordance with the invention makes it possible to determine positions with a high degree of accuracy, better than 1/2 m, which makes it possible to present e.g. advertisements with a high degree of precision.

The positioning system may also be used to guide the customer to a product he is looking for. With the aid of arrows on the display screen 21 of the mobile unit 7, the customer is guided step by step to the correct location in the shop.

Each mobile unit 7 is structured around its micro-controller 18, which coordinates part systems in the mobile unit 7, such as communication with base unit 1, position-indicators 2, interface 19 to the customer, or bar code reader 24.

The R-LAN 5 comprises a base station 6 and is connected to a corresponding unit 17 in the mobile units 7. Via the R-LAN 5, the mobile units 7 gain access to the information in the database of the base unit 1. Upon the inquiry of a customer, the information in the database is returned to the mobile units 7, where it is presented to the customer in a distinct manner. Each mobile unit 7 is in continuous contact with the base unit 1 via R-LAN 5, allowing them at all times to send information on their

position to the base unit 1. Several systems are available on the market that may be used for transfer of such information. The finished systems are often adapted for portable computers and are then connected via PCMCIA-terminal (Personal Computer Miniature Communications Interface Adapter terminal). Alternatively, the mobile unit 7 can have an integrated R-LAN part. A finished R-LAN 5 of this type gives the mobile unit 7 a connection corresponding to a conventional ethernet. In the mobile unit 7 a TCP/IP stack is then implemented, and via this stack the mobile unit 7 emits and receives data from the base unit 1. By means of the systems available on the market today communication at the speed of 2 Mbps may be reached.

15       With the aid of a small number of keys 22, alternatively with the aid of some other feed-in means, the customer is able to gain access, by pressing of keys, to the desired services and information of the system. All information is presented on the display screen, which preferably is of LCD or TFT type, which may show graphical information in the form of images or moving pictures, such as an MPEG film. The interface preferably also comprises a small loudspeaker 20 able to emit a short signal in the form of a "bleep" ,when the system wants to catch the customer's attention. The loudspeaker 20 preferably may be shut-off with the aid of a special key.

Preferably, the mobile unit is powered by some kind of battery and a charger 25 therefore preferably is built into the unit. The batteries 26 are charged while the mobile unit 7 is not in use, and when the unit is mounted on shopping cart they are charged while the latter is parked and tethered in a cart parking area. A solution of

this kind means that the battery 26 will be fully charged in the morning, when the shop opens, while at the same time allowing charging whenever the mobile unit 7 is not in use.

5           In order to manage and up-date the system, a mobile administration terminal 8 preferably is used, which is an extended version of a mobile unit 7. With the aid thereof, the location and price of the products may be up-dated. Preferably, it has direct access to the  
10   database of the base unit 1, thus enabling changes to be made whenever needed. Preferably, it is fitted with a cord-mounted barcode reader 24 for convenient stock-inventory making. The barcode reader 24 allows reading of the barcode of the product and all information contained  
15   in the system on the product is presented on the display screen 21. Changes and up-dating of the data thus made available suitably may be effected directly. Should, for example a product have been moved, its new position could rapidly be up-dated in that the mobile administration  
20   terminal 8 transmits its current position to the server. Also information on the number of articles of a certain kind may be adjusted, for example as the result of an inventory. A conventional PC keyboard 22 can preferably be connected to the mobile administration terminal. By  
25   means of the keyboard 22, the denomination or the price of a product can be altered in a simple manner. Also other information can conveniently be entered via the keyboard 22, such as lists of contents or links to pictures of the product.

30           Preferably, the mobile unit also is arranged to receive data for personal identification of the user. With the aid of such data, the information presented could be associated with a user or a group of users. One



example of such application is the possibility of display of a shopping list related to an individual user, which list may be based on previous purchases or transferred via the Internet from another system, such as the user's home computer. Another alternative is that the user may retrieve data based on his preferences, such as recreational interests, food preferences, and so on. The individual-related identification could be effected by fitting the mobile unit with a card reader, in which the user may insert a personal card, for instance the shop's customer card. In this case, it preferably could also be possible to obtain the balance of the account associated with the customer card. Instead of by means of a card reader the user could identify himself with a personal pin code entered via e.g. a keyboard that is connected to the mobile unit.

It is understood that numerous modifications of the embodiment described above are possible within the scope of the invention. For example, the sound signal from the position-signal transmission units could be an infrasonic sound signal, a conventional radio-frequency signal or the like. In addition, the mobile unit need not necessarily be mounted on the trolley or cart but could be a hand-held unit. These and other obvious and related varieties should be regarded to be included in the invention as defined in the appended claims.

## CLAIMS

1. An information handling system for sales facilities of consumer products, comprising

5 at least one mobile unit, such as a shopping-cart mounted terminal intended to be moved about within the sales facilities,

a local positioning system for determining the position of the mobile unit, comprising a number of  
10 position-signal transmission units,

a base unit comprising means for communication with the mobile unit,

said position-signal transmission units having a receiver for reception of an activation signal, and a  
15 transmitter for emitting a signal to the mobile unit in response to said activation signal, and said mobile units having receivers for reception of said signals from the position-signal transmission units, and processing means for determining the position of the mobile unit.

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2. An information handling system as claimed in claim 1, wherein

the base unit has transmission means for transmitting an activating signal to the position-signal  
25 transmission units and the mobile unit,

the position-signal transmission units have reception means for receiving the activation signal and means for transmitting a sound signal to the mobile unit in response to said activation signal, and

30 the mobile units have means for reception of said activation signal and sound signal, respectively, and processing means for determining the time differential between reception of the activation signal and the sound

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signal and for calculating, based on said time differential, the position relative to the position-signal transmission unit.

5           3. An information handling system as claimed in claim 2, wherein the means of the position-signal transmission units for transmission of a sound signal are arranged to emit different sound signals.

10           4. An information handling system as claimed in claim 2, wherein the means of the position-signal transmission units for transmission of a sound signal are arranged to emit identical sound signals with a time interval between the emission of each position-signal  
15 transmission unit.

5. An information handling system as claimed in any one of claims 2-4, having means for determination of the position of the mobile unit based on the sound signal  
20 from at least two position-signal transmission units, and preferably from three position-signal transmission units.

6. An information handling system as claimed in any one of claims 2-5, wherein the activation signal is a  
25 radio signal and the sound signal from the position-signal transmission units to the mobile units is an ultrasound signal.

7. An information handling system as claimed in  
30 claim 6, wherein the mobile unit comprises a radio receiver, a radio transmitter and an ultrasound receiver for reception of a signal from a position-signal transmission unit.

8. An information handling system as claimed in any one of claims 2-7, wherein the position-signal transmission unit comprises a radio receiver, a unit for  
5 determining whether the received signal is intended for the position-signalling unit, and an ultrasound transmitter.

9. An information handling system as claimed in  
10 claim 1, wherein each one of the position-signal transmission units has a unique identity, said identity being transferred to the mobile unit in response to the activation signal.

15 10. An information handling system as claimed in claim 9, wherein each one of the position-signal transmission units has a limited range which is shorter than the total area of the sales facilities, and preferably considerably shorter.

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11. An information handling system as claimed in claim 9 or 10, wherein the position-signal transmission units are passive units collecting energy for transmission from the activation signal.

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12. An information handling system as claimed in claim 9, 10, or 11, wherein said mobile units are arranged to emit the activation signal and wherein in addition the activation signal preferably is emitted with  
30 a limited range which is shorter than the total area of the sales facilities, and preferably considerably shorter.

13. An information handling system as claimed in any one of the preceding claims, said system being intended for indoor use and at least said position-signal transmission units being located indoors.

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14. An information handling system as claimed in any one of the preceding claims, wherein said base unit comprises a database containing data on the layout of the premises and adjoining areas and wherein the mobile unit  
10 has means for displaying a route guide based on the determined position relative to another position stored in the base unit.

15. An information handling system as claimed in  
15 claim 14, wherein the mobile unit is connected to a direction indicator, such as a compass, and wherein the direction of the mobile unit is known to the base unit.

16. An information handling system as claimed in  
20 any one of the preceding claims, wherein the database of said base unit comprises data on products or services, such as price, declaration of contents or the like, and on their associated position.

25 17. An information handling system as claimed in claim 14, 15 or 16, wherein said mobile unit and the base unit have means for transfer of such data between the mobile unit and the base unit.

30 18. An information handling system as claimed in claim 17, wherein the means of the mobile unit and the base unit for transfer of data on products and services is as Radio-LAN.

19. An information handling system as claimed in  
any one of the preceding claims, wherein the mobile unit  
has display means in the form of a display screen,  
5 loudspeakers, or a speech module.

20. An information handling system as claimed in  
any one of the preceding claims, wherein the base unit is  
arranged to automatically transfer to the mobile unit  
10 area-specific data obtained from the position-  
determination operation.

21. An information handling system as claimed in  
any one of the preceding claims, wherein the mobile unit  
15 has data-entering (feed-in?) means for allowing  
interaction with the base unit, such as a keyboard, a  
barcode reader, or a voice-interpretation module.

22. A method of information handling in sales  
20 facilities for consumer products, comprising the steps of  
determining the position within the sales facilities  
of at least one mobile unit, such as a shopping-cart  
mounted terminal, by transmitting an activation signal to  
stationary position-signal transmission units, said units  
25 in response thereto emitting a signal to the mobile unit,  
and on the basis of said signals determining the position  
of the mobile unit, and

transferring data between a base unit and the mobile  
unit depending on the position thus determined.

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23. A method of information handling, wherein the  
determination of the position of at least one mobile unit  
comprises the steps of.

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transmitting from the base unit a first signal to the position-signal transmission units and to the mobile units;

transmitting from a position-signal transmission  
5 unit a second signal in response to the first signal, which is a sound signal;

receiving in the mobile unit said first and said second signals and measuring the time differential between the receptions; and

10 based on said time differential, determining the position of the mobile unit relative to the position-signal transmission unit.

24. A method as claimed in claim 23, wherein said  
15 position-signal transmission units emit different sound signals.

25. A method as claimed in claim 23, wherein said position-signal transmission units emit identical sound  
20 signals with a time interval between each signal.

26. A method as claimed in claims 23, 24 or 25, said method further comprising the steps of

said base station repeatedly emitting said first  
25 signal intended for at least two position-signal transmission units, and preferably for three position-signal transmission units, and

calculating the position of the mobile unit relative to the respective position-signal transmission units.

30

27. A method as claimed in claim 23, 24, 25 or 26, wherein the first signal is a radio signal and the second signal is an ultrasound signal.

28. A method as claimed in claim 22, wherein said position-determination operation comprises the step of allocating to said position-signal transmission units a  
5 unique identity, said identity being transferred to the mobile unit in response to the activation signal.

29. A method as claimed in claim 28, wherein the mobile units emit the activation signal, and wherein said  
10 activation signal further preferably is emitted with a limited range, which is shorter than the total area of the sales facilities, and most preferably considerably shorter.

15 30. A method as claimed in any one of claims 22-29, wherein transferred data relate to data on products or services, such a price, declaration of contents or the like, and the position associated therewith.

20 31. A method as claimed in any one of claims 22-30, wherein the base unit automatically transfers to the mobile unit area-specific data obtained from the position-determination operation.



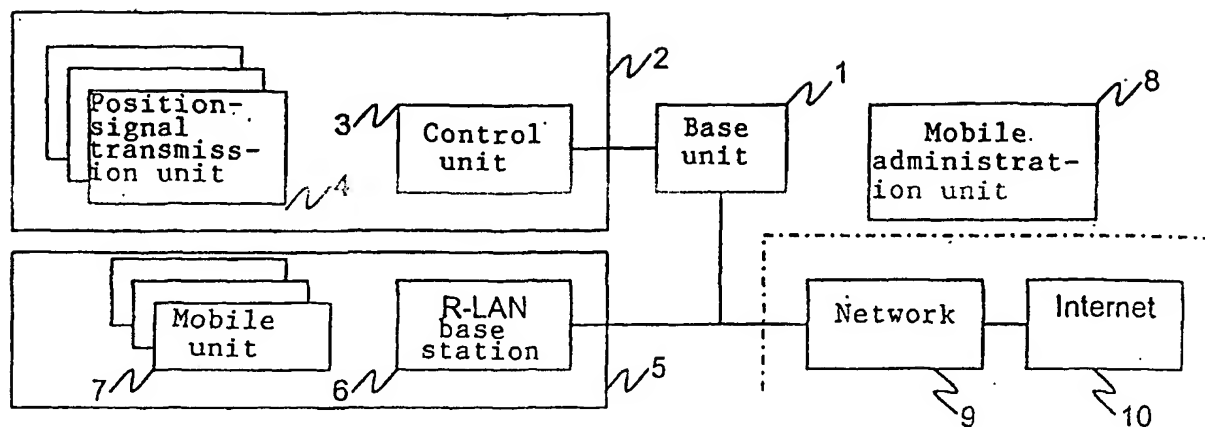


Fig. 1

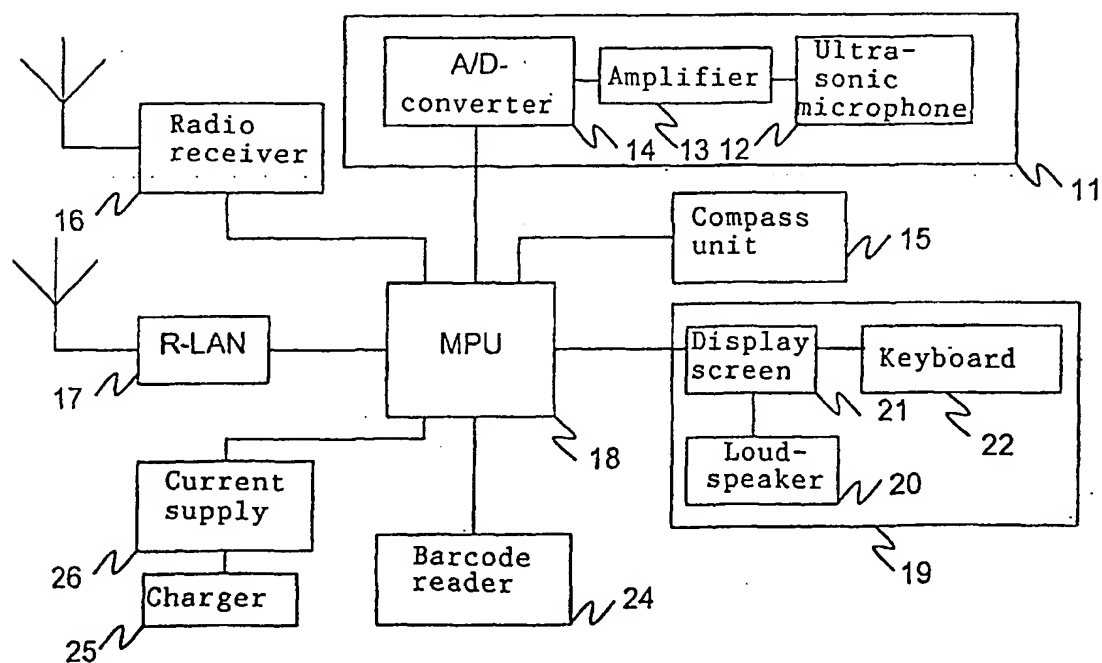


Fig. 2

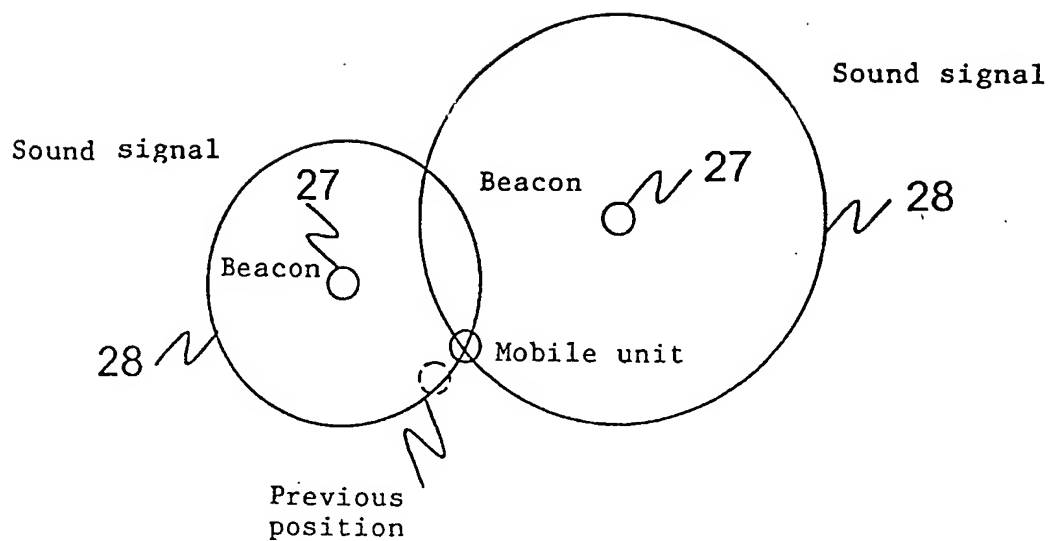


Fig. 3

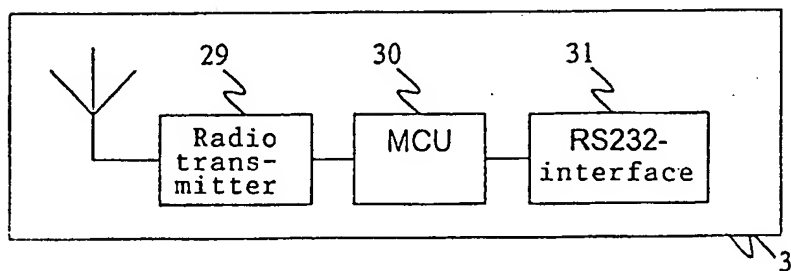


Fig. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/00642

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G07G 1/14, G01S 11/16

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G07G, G01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5821513 A (T.O'HAGAN ET AL), 13 October 1998 (13.10.98)	1-31
Y	US 5287266 A (J.MALEC ET AL), 15 February 1994 (15.02.94)	1-31
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Y	US 5491670 A (T.J.WEBER), 13 February 1996 (13.02.96)	1-31
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Y	FI 94183 B (VALTION TEKNILLINEN TUTKIMUSKESKUS), 13 April 1995 (13.04.95)	1-31
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☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

15 June 2001

Date of mailing of the international search report

19-06-2001

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INTERNATIONAL SEARCH REPORT  
Information on patent family members

28/05/01

International application No.

PCT/SE 01/00642

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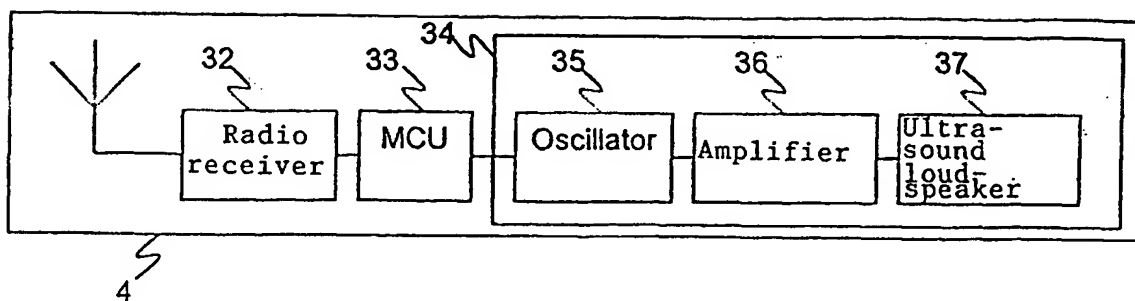


Fig. 5